FAMILY CALENDAR NOTIFICATION AND TRACKING

Lee M. Wollrab
1327 E. Trevino Street
Eagle ID 83616
Citizenship: U.S.A.

TECHNICAL FIELD

This application relates to wireless communication and tracking, and more particularly to family calendar notification and tracking.

BACKGROUND

In the present environment there are many different devices for communicating between people or between groups of people. However, even if everybody carried a wireless telephone or similar device, there is no efficient method for families or other groups to plan meetings/events and to communicate changes in individual plans that could affect the family meeting/event. For example, a child could be injured, and a parent making an unplanned detour to a hospital emergency room might not have time to tell/call everyone else to let them know of the change in plans.

Likewise, there is presently no efficient way of determining the location of a member of a family or other group. In one scenario, if a teenager borrows the family car on a Friday night, has a car wreck, and rolls off a cliff, nobody would know the location of the teenager. Assuming that the teenager was expected home at 2:00 a.m. and the parents were alarmed at 3:00 a.m., the parents would have no idea of the teenager's present location or any record of the last location of the teenager.

SUMMARY OF THE INVENTION

The present invention is directed to an electronic system and method for managing location, calendar, and event information. The system comprises at least two hand portable electronic devices, each having a display device to display personal profile, location, and event information, and means for processing, storing, and wirelessly communicating data. A software program running in the electronic device can receive local and remote input data; store, process, and update personal profile, event, time, and location information; and convert location information into coordinates of a graphic map display. The system additionally includes at least one earth orbiting satellite device using remote sensing technology to determine the location coordinates of the electronic device. The electronic devices receive synchronization messages broadcast by the satellite device, causing the software program to update the personal profile, event, time, and location information stored in each hand portable electronic device.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a high level schematic diagram illustrating the hardware architecture of a Family Calendar Tracking and Notification system, in accordance with embodiments of the present invention;

FIGURE 2 is a schematic diagram illustrating the transmission of physical location information of PDA devices after a change of physical locations relative to those of FIGURE 1;

FIGURE 3 is a schematic diagram illustrating two-way direct wireless communication between PDA devices; and

FIGURES 4A-4C are schematic representations depicting exemplary map images on the display screen of a PDA device.

DETAILED DESCRIPTION

FIGURE 1 is a high level schematic diagram illustrating the hardware architecture of a Family Calendar Tracking and Notification system, in accordance with embodiments of the present invention. Family Calendar Tracking and Notification system 10 includes one to many substantially identical personal digital assistant (PDA) devices represented by PDA devices PDA-1 through PDA-5 (PDA devices 14-1 through 14-5) and one or more satellite devices 12. PDA device 14-1 through 14-5 is an hand portable electronic device similar, for example, to commercially available Hewlett Packard Jornada™, Palm Pilot™, Handspring Visor™, Compaq iPaq™, Sony CLIE™, cellular and/or 'smart' wireless telephones, which is 2-way wireless communications capable and is remote sensing capable. Each PDA device 14-1 through 14-5 includes a respective display device 15-1 through 15-5.

Installed in each PDA device 14-1 through 14-5 is a copy of calendar 16-1 through 16-5, a software program which can store family member profiles, member calendars, member locations, and family profiles. Calendar 16-1 through 16-5 is capable of tracking and synchronizing events (appointments such as face-to-face or telephone meetings, sporting events, social events, etc), established by a member, e.g., user identified by a person's first name and last name, who is defined within a member profile which contains the member's personal information. Events preferably require uniquely associating a time and date with a physical location, which can be shared among a pre-defined family of members in order to facilitate members being able to meet, physically and/or virtually, at the same time, on the same date. The term "family" as defined herein is generalized to include not only biologically related individuals, but social, recreational, educational, professional, work, or other common interest groups of individual members that have a need or interest in maintaining close communication among themselves. Although typically a separate PDA device 14-1 through 14-5 is assigned to each individual family member, in some implementations a single PDA device can be shared among two or more family members.

PDA devices 14-1 through 14-5 communicate with one another via satellite device 12 and also by direct 2-way wireless communication. Satellite device 12 is a global

communications device orbiting the earth substantially above the earth's atmosphere and capable of continuously (24 hours per day and 7 days per week) receiving information from and broadcasting information to (transceiving) one or more PDA devices 14-1 through 14-5 and its respective installed calendar 16-1 through 16-5. Satellite device 12 and PDA devices 14-1 through 14-5 collectively utilize remote sensing technology and interactive wireless communication to track the physical location of each PDA device 14-1 through 14-5.

In operation, calendar 16-1 through 16-5 stores information including member profiles, member calendars, member locations, and family profiles. Member profile(s) include information pertaining to individual members, for example:

email address - e.g., firstname_lastname@subdomain.domain;

member name - e.g., firstname lastname;

residence address - e.g., street, city, state/province, zip/postal code, country;

residence and/or other phone - e.g., dialing code and number;

FAX phone;

text-based notes - e.g., up to a defined number of characters;

other member-defined fields - e.g., date of birth, date of marriage, alternate address/phone/fax/email address; and/or

family membership - e.g. family name and/or alpha-numeric identifying code/password.

Member copies of calendar 16-1 through 16-5 track and synchronize events identified by descriptive names, which provide the parent fields for attendees, event location, time and date. An event location includes physical address, e.g., street address, city, state/province, zip/postal code, country, and REMOTE SENSING location coordinates, e.g., latitude-

longitude coordinates (degrees, minutes, seconds), which are the basis of a vector-based Geographic Information System [GIS] data set, where data are stored as a sequence of precise X,Y coordinates and vectors which can be displayed as a map image on PDA device 14-1 through 14-5, as described below in more detail. Other event location data include phone number at the event location and/or phone number of a designated event contact individual, and Internet URL for an electronic meeting room.

Member location(s) are preferably stored in calendar 16-1 through 16-5 as remote sensing location coordinates defined above, and are updated periodically for each member. In some embodiments, multiple sequential sets of remote sensing location coordinates are stored for each member to create a historical tracking record of movement for the member/PDA device. This can be retrieved later to determine where a member/PDA device has been physically located over time for such purposes as tracking member movements or locating a lost member. Calendar 16-1 through 16-5 can translate remote sensing location coordinates into a graphic map image, e.g. a .jpg or .gif file, depicting the relative locations of all members/PDA devices within a family. In a family profile, calendar 16-1 through 16-5 stores an alpha-numeric family name/identifier and a list of all members, for example, in order of their email address.

Calendar 16-1 through 16-5 preferably generates information requests, including membership requests from within the family requesting a membership status for a non-member and from non-members requesting to join a specified family. Calendar 16-1 through 16-5 additionally generates synchronization requests from members, requesting synchronization within a family, for example to update member profile information, update member calendar information, update member location information, and/or update family profile information; and from within calendar 16-1 through 16-5 requesting synchronization among a family and or with a member to update the above information among the family or a subset of the family.

Calendar 16-1 through 16-5 preferably sends to and/or routes to and receives from satellite device 12 in encrypted format any of the information in the member profile, member

calendar, member location, and or family profile destined for member(s) email address. Calendar 16-1 through 16-5 processes queries, sorts requests, and synchronizes calendars among members within a family/group. FIGURES 1 and 2 illustrate communication between calendars 16-1 through 16-5 in PDA devices 14-1 through 14-5 via satellite device 12 over wireless data paths 18-1 through 18-5 respectively, for example to synchronize calendars 16-1 through 16-5. Calendar synchronization occurs at regular intervals, e.g. at 5-minute intervals. Calendar 16 generates a new family code or password periodically, for example each time family membership changes, and distributes it to each family member's profile. Calendar 16-1 through 16-5 displays via display devices 15-1 through 15-5 information including the respective member's profile, location, and events, in addition to other family members' profiles, locations, and events.

Satellite device 12 preferably receives, processes and stores information sent from individual PDA devices 14-1 through 14-5 into vector-based remote sensing data representing the physical location of the PDA device, and broadcasts information simultaneously to multiple PDA devices 14-1 through 14-5. The updated physical location information is transmitted in accordance with an established schedule (e.g. every 5 minutes) to specific member PDA devices or to all PDAs within a defined family for synchronizing/replication. This transmission can be sent either directly via infrared or other wireless link from one PDA to another PDA in sufficient proximity or to satellite device 12 for rebroadcast to all PDA devices within a defined family. FIGURE 2 is a schematic diagram illustrating the transmission of physical location information of PDA devices after a change of physical locations relative to those of FIGURE 1. In FIGURE 2, PDA device 14-2 has moved through a displacement D2 relative to its previous position PDA-2-A and PDA device 14-4 has likewise moved through a displacement D4 relative to its previous position PDA-4-A. As illustrated in FIGURE 2, remote sensing coordinates reflecting the movements of PDA devices 14-2 and 14-4 are broadcast by satellite device 12 to all PDA devices 14-1 through 14-5 of system 10.

PDA device 14-1 through 14-5 stores and runs calendar software program 16-1 through 16-5 used to manage all information storage and transfers between PDA devices 14-1

through 14-5 via satellite device 12. PDA devices 14-1 through 14-5 communicate directly with one another over wireless data paths 19-1, 19-3 as illustrated in FIGURE 3, to exchange stored information/data using, for example, infrared technology. Alternatively, PDA devices 14-1 through 14-5 communicate with one another using one or more of other short distance wireless technologies, for example, cellular technology or Bluetooth™ technology which, unlike infrared, are not restricted to line of sight transmission. In some embodiments, wireless portions of data paths between PDA devices 14-1 through 14-5 are interconnected through terrestrial wired network portions, for example telephone cable and/or the public Internet.

PDA devices 14-1 through 14-5 can utilize wireless remote sensing technology to establish and communicate remote sensing data between PDA device 14-1 through 14-5 and satellite device 12. PDA device 14-1 through 14-5 can display a map image via display device 15-5 through 15-5 depicting the relative locations of all members/PDA devices within a family. FIGURES 4A-4C are schematic representations depicting exemplary map images 40-1 through 40-3 on the screen of display device 15-1 of PDA device 14-1. In map image 40-1 the location 44-1 of family member/PDA device 14-1 is shown relative to physical features, for example roads 41 and 42. In map image 40-2 the locations 44-1 through 44-5 of five family members/PDA devices 14-1 through 14-5 respectively are shown simultaneously relative to one another and relative to roads 41, 42. In map image 40-3 symbols interconnected with location 44-5 depict sequential historical locations of family member/PDA device 14-5 relative to location 44-1 of PDA device 14-1 and roads 41, 42.

Calendar 16-1 through 16-5 utilizes existing technologies, for example Lotus Notes/Domino and/or Microsoft Outlook/Exchange can provide a base software program to achieve the calendar functions described above. Calendar 16-1 through 16-5 additionally includes software to receive, process, and store physical location information (vector-based remote sensing coordinates), which can be updated periodically to track physical movements as a member/PDA device moves from one location to another. Typically, calendar 16-1 through 16-5 runs on a microcomputer installed in PDA device 14-1 through 14-5 and stores

information in a digital memory device, for example RAM, flash EPROM, other non-volatile memory, or some combination thereof installed in PDA device 14-1 through 14-5.

Some embodiments include alternative PDA devices providing a reduced subset of the functionality of PDA devices described above. These reduced functionality PDA devices function primarily as location reporting devices, applicable for example to young children, physically and/or mentally handicapped, aged, or retarded individuals. The reduced functionality PDA devices can be further applicable to convicts, parolees, and/or other offenders, and can be configured, for example, as collars, necklaces, bracelets, belts, and/or anklets.

Synchronizing has been commercialized, for example, using Lotus Notes/Domino software, and is commonly referred to as "replication". This technology can be adapted in embodiments of the present invention to encompass and manage synchronization in an environment where the wireless communication link between two PDA devices is via satellite device 12.

Embodiments of the present invention provide a system and method in which a master family calendar is synchronized with PDAs for each family member, which tracks each PDA location via remote sensing (satellite) and alerts other family members (e.g. parents) to the locations of other family members' (e.g. children) PDAs or alternatively their cellular or 'smart' wireless telephones. In some embodiments, the system also e-mails or sends a periodic electronic notification to each family member of family events (e.g. kids swim lesson Monday night at West Boise YMCA at 6:30 p.m.), which can include driving directions customized for the specific location of each family member to get from their current location to the event. Embodiments of the system communicate changes in individual plans which could affect the family meeting/event. (e.g., child gets hurt and parent takes detour to hospital and does not have time to tell/call everyone else to let them know of change in plan, in which case a PDA device could take one message and location and communicate it to rest of family with details of why a change had to occur, seriousness of situation, etc.) Optionally, an alert is issued when changes in plans are communicated.

In some embodiments, a PDA device transmits an alarm message if the device location moves outside of a prescribed physical limit. For example, if a child had a boundary prescribed on their PDA device, and the device is carried past the boundary, then an alert is issued to all the other PDA devices/family members.

Embodiments in accordance with the present invention allow members of a family or other group to share calendar schedule information on a hand portable device in near real time and to synchronize that information through wireless communications with other members of an identified family, work, or other group. Not only is information synchronized, but the location of that device is also tracked and shared among the group. Location information can then be converted and displayed, for example as coordinates on a graphic map. Through remote sensing, the present system allows family members to know/see the locations of other family members without having to physically search.

In a further embodiment, a PDA device transmits an alarm, if the device moves outside of a prescribed limit. For example, if limits are set on a child's PDA device and if the device is carried beyond those limits, then an alert can be transmitted to all the other family members to warn that this child is out of its bounds.

A member's PDA device stores not only the last record of that member's own location and calendar entries, but in addition the records of the last entries from each of the other PDA devices/family members. This decentralized architecture maintains peer to peer functionality, without adding another layer, for example a group store. Advantageously, peer to peer functionality also confers robustness through redundancy, such that if a PDA device becomes inoperative for a short time and consequently misses a message, a backup copy of the message can be recovered and retransmitted at a later time by another PDA device in the group.

In a further embodiment, a PDA device can also store all of a member's personal contact information, for example address book and telephone numbers, and can communicate in the background with individuals and groups outside the immediate group. These background communications can be, for example, with another family group or work group,

to be aware of their calendars and they aware of the member's group, to help in coordination of event planning and other activities involving more than one group. Additionally, a PDA device can provide linkages between personal contact information and event/location information. For example a member viewing an event display can utilize a short cut access to the personal contact information for the responsible individual. Likewise a member viewing a display of location coordinates for a PDA device assigned to another member can utilize a short cut access to that other member's personal contact information.

Calendar 16-1 through 16-5 is able to translate Global Positioning System (GPS) or other remote sensing location coordinates into a visual map image depicting the relative locations of all members/PDA devices within a family. GPS tracking, reporting and display for a Handspring Visor™ can be accomplished by Magellan Corporation, 960 Overland Court, San Dimas, California 91773, Tel (800) 669-4477, Fax (909) 394-7050, which has commercialized a GPS module for any Handspring (Handspring, Inc., 189 Bernardo Avenue, Mountain View, California 94043, Tel (716) 871-6448, support@handspring.com) Visor™ hand held PDA in the form of a Magellan GPS Companion™ (http://handspring.com/products/sbmodules/magellandetails.jhtml and http://www.palmgear.com/hs/products/prodoverview.cfm?prodID=388&prodcatID=5) springboard (plug-in) module, but this is a singular module which does not allow simultaneous wireless communication to the public Internet.

Xircom, Inc., 2300 Corporate Center Dr., Thousand Oaks, California 91320, Tel (805) 376-9300, Fax (805) 376-9311, has commercialized wireless communication to the public Internet for the Handspring Visor™ handheld PDA in the form of a Springport™ Modem 56 GlobalACCESS™ (http://handspring.com/products/sbmodules/springportdetails.jhtml and http://www.palmgear.com/hs/products/prodoverview.cfm? prodID=354&prodcatID=5) springboard (plug-in) module. This is a singular module which does not allow simultaneous remote sensing capability.

'Smart phones' are cellular wireless telephones incorporating minibrowsers that provide Internet access as well as personal digital assistant (PDA) functionality. PDA

functions typically include a calendar, address book, contact manager, task list, and occasionally an alarm, scheduler, and calculator. Additionally, a smart phone's ability to store personal information generally goes beyond that of the internal phone book in a standard, voice-only wireless phone. For further discussion, see for example http://equip.zdnet.com/communications/cellularphones/feature/16f0a/index_6_1.html.

Embodiments of the present invention provide two-way wireless communication between a PDA device and at least one satellite, which is simultaneously used to continually track the physical location of the PDA device (and/or multiple PDA devices) and communicate this location data (remote sensing coordinates) to all PDA devices within a defined family. Alternatively, more than one type of satellite can be used in embodiments of the present invention. For example, one type of satellite can perform physical location tracking functions using remote sensing, and a second type of satellite can provide two-way wireless communication with one or more PDA devices, including broadcast wireless transmission. Particularly, embodiments of the present invention fill a parent's need to track their teenager that borrowed the family car on a Friday night and to know that teenager's whereabouts at a particular time.